which was placed on the far Side of the Monſtrous Head, the other as uſual in other Calfs. It breathed equally at both Mouths, and had Communication with the ſame Throat, but took its Nouriſhment only at the perfect Mouth: The under Jaw of the other being ſo weak, that the Mouth always ſtood open and drivell'd. It appeared on the Left ſide to be a perfect Calf, and look'd very lively, and was, at Three Days Old, as large and ſtrong as other Calfs uſually are at Ten Days or a Fortnight.

IV. *A Queſtion in Muſick lately propoſed to Dr.* Wallis, *concerning the Diviſion of the Monochord, or Section of the Muſical Canon: With his Anſwer to it.*

Queſtion.

TAKE a String of any Muſical Inſtrument, and divide the ſame into two equal Parts, and ſtop the String there; it ſhall be an Eighth, which conſiſts of twelve Semi-tones.

Hence it appears, that the Frets are nearer to one another toward the Bridge, and wider toward the Nut or Head of a Viol. And that they decreaſe or proceed in a Geometrical Proportion.

Quære, How is it poſſible, from the foreſaid Hypotheſis, to divide the other 11 Semi-tones, in their due Proportion, and to demonſtrate the ſame. And whether the other Diſtances aſſigned by *Simpſon* in his *Compendium of Muſick*, (and Chapter of Greater and leſſer Semi-tones) are demonſtrable from the ſaid Hypotheſis.

Anſwer.

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Anſwer. *March* 5. 169⅞.

WHAT Method is uſed by *Simſon* (in the Book mentioned) to divide a String or *Chord*, I know not: Nor have I the Book at Hand to conſult.

That a String *open* (or at its full Length) will ſound (what we call) an Octave (or *Diapaſon*) to that of the ſame String *ſtopped in the Middle* (or at half its Length) is very true. And hence it is that we commonly aſſign, to an Octave, the *Duple* Proportion (or that of 2 to 1:) becauſe ſuch is the Proportion of Lengths (taken in the ſame String) which give thoſe Sounds.

And (upon a like Account) we aſſign to a Fifth (or *Diapente*) the *Seſqui-alter* Proportion (or that of 3 to 2:) And, to a Fourth (or *Dia-teſſeron*) the *Seſquitertian* (or that of 4 to 3:) And to a *Tone* (which is the Difference of a Fourth and Fifth) The *Seſqui-octave* (or that of 9 to 8:) Becauſe Lengths (taken in the ſame String) in theſe Proportions, do give ſuch Sounds.

And (univerſally) whatever Proportion of Lengths (taken in the ſame String, equally ſtretched) do give ſuch and ſuch ſounds; ſuch Proportions (of Gravity) we aſſign to the Sounds ſo given.

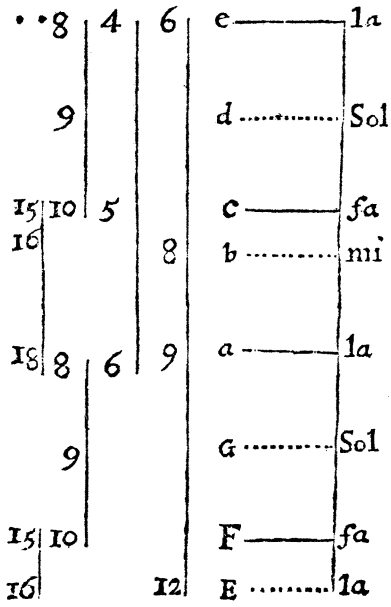
But when an Eighth (or Octave) is ſaid (in common Speech) to conſiſt of 12 Hemi-tones, or 6 Tones; this is not to be underſtood according to the utmoſt Rigour of Mathematical Exactneſs, (of ſuch 6 Tones, as what they call the *Diazeuctick Tone*, or that of *la mi*, which is the Difference of a Fourth and Fifth;) but, as exact enough for common Uſe. For Six ſuch Tones (that is, the Proportion of 9 to 8 Six Times repeated) is ſomewhat *more* than that of an Octave (or the Proportion of 2 to 1:) And, conſequently, ſuch an *Hemi-tone*, is ſomewhat *more* than the Twelfth Part of an Eighth, or Octave, or *Dia-paſon*. But the Difference is ſo little, that the Ear can hardly diſtinguiſh it: And therefore (in common Speech) it is uſual ſo to ſpeak.

And, accordingly, when we are directed to take the Lengths (for what are called the 12 *Hemi-tones*) in Geometrical Proportion: it is to be underſtood (not, to be ſo in the utmoſt Strictneſs, but) to be accurate enough for common Uſe; for placing

placing the Frets on the Neck of a Viol, or other Muſical Inſtrument; wherein a greater Exactneſs is thought not neceſſary. And this is very convenient, becauſe (thus) the Change of the Key (upon altering the Seat of *mi*) gives no new Trouble, for this doth indifferently ſerve any Key; and the Difference is ſo ſmall, as not to offend the Ear.

But thoſe who chooſe to treat of it with more exactneſs, go this way to work.

Preſuppoſing the Proportion for an Octave (or *Dia-paſon*) to be that of 2 to 1; they divide this into Two Proportions; not juſt *equal* (for that would fall upon *ſurd* Numbers, as of $\sqrt{2}$ to 1;) but *near-equal* (ſo as to be expreſſed in ſmall Numbers.) In order to which, inſtead of taking 2 to 1, they take (the double of theſe Numbers) 4 to 2; (which is the ſame Proportion as before;) and interpoſe the middle Number 3. And, of theſe Three Numbers, 4, 3, 2, that of 4 to 3, is the Proportion for a Fourth (or *Dia-teſſeron.*) And that of 3 to 2, the Proportion for a Fifth (or *Dia-pente.*) And theſe Two put together, make up that of an Octave (or *Diapaſon,*) that of 4 to 2, (or 2 to 1.) And the Difference of thoſe Two, that of a *Tone* or 9 to 8. As will plainly appear in the ordinary Method of Multiplying and Dividing Fractions. That is, $\frac{4}{3} \times \frac{3}{2} = \frac{4}{2} = \frac{2}{1}$. And $\frac{4}{3}) \frac{1}{2} (\frac{2}{3}$



Thus, in the common Scale (or *Gam-ut*) taking an Octave, in theſe Notes, *la, fa ſol la, mi, fa ſol la*; ſuppoſe, from *E* to *e*, (placing *mi*, in b *fa* ♮ *mi*; which is called the *Natural Scale*;) the Lengths for the Extremes *la la*, an Octave, are as 2 to 1, or 12 to 6. Thoſe for *la la* (in *la fa ſol la*) or *mi la* (in *mi fa ſol la*) a Fourth, as 4 to 3, or 12 to 9, or 8 to 6. Thoſe for *la mi* (in *la fa ſol la mi*) or *la la* (in *la mi fa ſol la*) a Fifth, as 3 to 2, or 12 to 8, or 9 to 6. Thoſe for *la mi*, the *Diazeuctick-Tone* (or difference of a Fourth and Fifth,) as 9 to 8. So have we for thoſe Four Notes *la la mi la*, their Proportionate Length in the Numbers 12 9 8 6.

Then

Then, if we proceed in like manner, to divide a Fifth (or *Dia-pente*) *la fa ſol la mi*, or *la mi fa ſol la*, or the Proportion of 3 to 2, into *near-equals*, (taking double Numbers in the ſame Proportion, 6 4; and interpoſing the middle Number 5;) of theſe Three Numbers, 6 5 4; that of 6 to 5, is the Proportion of a leſſer Third (called a *Tri hemitone*, or Tone and half,) as *la fa* (in *la mi fa.*) And that of 5 to 4, is the Proportion of the Greater Third (commonly called a *Ditone*, or Two Tones,) as *fa la* (in *fa ſol la*) which Two put together, make a Fifth, as 3 to 2; That is $\frac{6}{5} \times \frac{5}{4} = \frac{6}{4} = \frac{3}{2}$. And their difference is as 25 to 24: That is $\frac{6}{5}$ $\frac{5}{4}$ ($\frac{25}{24}$ So have we for theſe 3 Notes *la fa la*, their proportionate Lengths in Numbers, as 6 5 4.

In like manner, if we divide a *Ditone* (or Greater Third) as *fa la* (in *fa ſol la*) whoſe Proportion is as 5 to 4 (or 10 to 8) into Two *near-equals* (by help of a middle Number 9;) then have we (in theſe Three Numbers 10 9 8) that of 10 to 9, for (what they call) the *Leſſer Tone*: And that of 9 to 8, for (what they call) the *Greater Tone*.

But, whether *fa ſol* ſhall be made the *Leſſer* (as 10 to 9) and *ſol la* the *Greater*, as 9 to 8;) or, This the *Leſſer* (as 10 to 9) and That the *Greater* (as 9 to 8) or ſometime This and ſometime That, as there is occaſion, (to avoid what they call a *Schiſm*;) is ſomewhat indifferent: For, either way, the Compound will be, as 5 to 4; and the Difference (which they call a *Comma*) as 81 to 80. That is, $\frac{9}{8} \times \frac{10}{9} = \frac{10}{8} \times \frac{9}{8} = \frac{10}{8} = \frac{5}{4}$. And $\frac{10}{9}) \frac{9}{8} (\frac{81}{80}$.

Laſtly, If from that of the *Tri-hemitone* (or Leſſer Third) *la mi fa*; whoſe Proportion is as 6 to 5; we take that of the Tone *la mi* (which is the Difference of a Fourth and Fifth) as 9 to 8; There remains for the Hemi-tone *mi fa* (or *la fa*) that of 16 to 15. That is $\frac{9}{8}) \frac{6}{5} (\frac{48}{45} = \frac{16}{15}$.

Or, the *Tri-hemitone* (or Leſſer Third) whoſe Proportion is as 6 to 5; may be divided into Three *Near-equals*, (by taking Triple Numbers, in the ſame Proportion, 18 15; and interpoſing the Two Intermediates, 17 16;) which will therefore be as 18 to 17, and as 17 to 16, and as 16 to 15; That is, $\frac{18}{17} \times \frac{17}{16} \times \frac{16}{15} = \frac{18}{15} = \frac{6}{5}$.

Where alſo the *Greater Tone*, who's Proportion is as 9 to 8, or 18 to 16, is divided into its Two *Near-equals* (commonly called *Hemi-tones*,) that of 18 to 17, and that of 17 to 16: That is, $\frac{18}{17} \times \frac{17}{16} = \frac{18}{16} = \frac{9}{8}$. And

And the *Leſſer Tone*, that of 10 to 9, or 20 to 18, may be in like manner divided into that of 20 to 19, and that of 19 to 18: That is, $\frac{20}{19} \times \frac{19}{18} = \frac{20}{18} = \frac{10}{9}$.

Which Diviſions of the *Greater* and *Leſſer* Tone, anſwer to what is wont to be deſigned by *Flats* and *Sharps*.

So that (by this Computation,) of theſe Eight Notes, *la, fa ſol la, mi, fa ſol la*; their Proportions ſtand thus; that of *la fa* (or *mi fa*) is as 16 to 15. That of *fa ſol* as 10 to 9, and that of *ſol la* as 9 to 8: (or elſe that of *fa ſol* as 9 to 8, and that of *ſol la* as 10 to 9,) That of *la mi* as 9 to 8. And if either of the Tones (Greater or Leſſer) chance to be divided (by Flats or Sharps) into (what they call) Hemi-tones, their Proportions are to be ſuch as is already mentioned.

There may be a like Diviſion of a Fourth (or *Dia-teſſaron*) into Two *Near equals*: And of ſome others of theſe, into Three *Near-equals*. Which might be of uſe for (what they were wont to call) the *Chromatick* and *Enarmonick* Muſick. But thoſe Sorts of Muſick, having been long ſince laid aſide, there is now no need of theſe Diviſions, as to the Muſick now in uſe.

V. *Part of a Letter from* Mr. Ray, *F. R. S. to* Dr. Sloane, *giving an Account of the Poyſonous Qualities of* Hemlock-Water-Drop-Wort.

I Shall now communicate to you, a Story or Two of the direful Effects of *Oenanthe aquatica, Cicutæ facie ſucco Viroſo* of *Lobel*, which we may Engliſh *Hemlock-Water-Dropwort*, upon ſeveral Perſons that eat of the Roots of it, ſent me not long ſince in a Letter from Dr. *Francis Vaughan*, a Learned Phyſitian in *Ireland*, living at *Clonmell*, in the County of *Tipperary*. This Gentleman obſerving me, notwithſtanding what Dr. *Johnſon* in his *Gerardus emaculatus*, and *Lobel* in his *Adverſaria*